WHAT IS CLAIMED IS:

1 A peptide analog comprising a peptide in which at least one amino 2 acid, but less than all amino acids, is replaced by an azacyclohexenone group having the 3 formula

4 in which:

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6 R^1 is CH_2 or NH,

 R^2 is CH or N, and

8 R³ is H or an amino acid side chain,

9 such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

12 acid side chain,

and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

16 peptide analog.

1 2. A peptide analog comprising a peptide in which at least one amino

acid, but less than all amino acids, is replaced by an azacyclohexenone group having the

3 formula

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6 R^1 is CH_2 or NH,

7 R² is CH or N, and

8 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

10 acid side chain,

and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

14 peptide analog.

- 1 3. The peptide analog of claims 1 or 2 in which R^1 is CH_2 and R^2 is N.
- 1 4. The peptide analog of claims 1 or 2 in which R¹ is NH and R² is CH.
- The peptide analog of claims 1 or 2 in which R¹ is NH and R² is N.
- 1 6. The peptide analog of claims 1 or 2 in which R¹ is CH₂ and R² is CH.
- 7. The peptide analog of claims 1 or 2 in which said azacyclohexenone group is an L-stereoisomer relative to R³ when R³ is an amino acid side chain.
 - 8. The peptide analog of claims 1 or 2 in which said amino acid side chain is a side chain of a natural amino acid.
 - 9. The peptide analog of claims 1 or 2 in which said amino acid side chain is a side chain of an unnatural amino acid.
 - 10. The peptide analog of claims 1 or 2 in which said amino acid side chain is a member selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted

- by -O-, C₁-C₆ alkyl interrupted by -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-
- 4 (C₁-C₆ alkyl), guanidino-(C₁-C₆ alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl),
- 5 indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃ alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆
- 6 alkyl), imidazolyl- $(C_1-C_6 \text{ alkyl})$, phenyl, and sulfoximino- $(C_1-C_6 \text{ alkyl})$.
- 1 The peptide analog of claims 1 or 2 in which said amino acid side
- 2 chain is a member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl),
- 3 carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂
- 4 alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂
- 5 alkyl), and hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.
- 1 12. The peptide analog of claims 1 or 2 in which R¹ is CH₂, R² is N, and
- 2 said amino acid side chain is a member selected from the group consisting of C₁-C₄ alkyl,
- 3 hydroxy-(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino-(C₂-C₄ alkyl),
- 4 carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl,
- 5 phenyl- $(C_1-C_2 \text{ alkyl})$, and hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.
- 1 13. The peptide analog of claims 1 or 2 in which the amino acids of said
- 2 peptide analog are from 2 to 200 in number and said azacyclohexenone groups are from 1 to
- 3 100 in number.
- 1 14. The peptide analog of claims 1 or 2 in which the amino acids of said
- 2 peptide analog are from 2 to 200 in number, said azacyclohexenone groups are from 1 to 100
- 3 in number, and the number ratio of said azacyclohexenone groups to amino acids is from 1:10
- 4 to 10:1.
- 1 15. The peptide analog of claims 1 or 2 in which the amino acids of said
- 2 peptide analog are from 2 to 100 in number and said azacyclohexenone groups are from 1 to
- 3 50 in number.
- 1 16. The peptide analog of claims 1 or 2 in which the amino acids of said
- 2 peptide analog are from 2 to 100 in number, said azacyclohexenone groups are from 1 to 50
- 3 in number, and the number ratio of said azacyclohexenone groups to amino acids is from 1:10
- 4 to 10:1.

- 1 The peptide analog of claims 1 or 2 in which all remaining amino acids
- 2 in said peptide analog are a combination of natural and unnatural amino acids.
- 1 18. The peptide analog of claims 1 or 2 in which all remaining amino acids 2 in said peptide analog are natural amino acids.
- 1 19. The peptide analog of claims 1 or 2 in which R¹ is CH₂, R² is N, and
- 2 R³ is a member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl),
- 3 carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂
- 4 alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂
- 5 alkyl), and hydroxyphenyl-(C₁-C₂ alkyl), and all remaining amino acids in said peptide
- 6 analog are natural amino acids.
 - 20. A peptide analog having the formula

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4 R^1 is CH_2 or NH,

5 R^2 is CH or N,

6 R³ is H or an amino acid side chain,

7 such that in at least one such azacyclohexenone group:

8 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

9 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

10 acid side chain,

and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

13 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

14 peptide analog,

the R4's are the same or different and each R4 is either H or an amino acid side 15 16 chain, R⁵ is a member selected from the group consisting of peptide chain 17 18 terminating groups and 19 in which R⁷ is a member selected from the group consisting of H, 20 alkyl, acyl, carbamoyl, and alkoxycarbamoyl, and * denotes the site of 21 22 attachment, R⁶ is a member selected from the group consisting of peptide chain 23 24 terminating groups and 25 in which R⁸ is a member selected from the group consisting of 26 27 hydroxyl, alkoxy, alkylamino, dialkylamino, and arylamino, and * 28 denotes the site of attachment, and

21. A peptide analog having the formula

n is at least 2.

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R¹ is CH₂ or NH, 4

R² is CH or N. 5

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

8 acid side chain,

9 and when said peptide analog contains two or more azacyclohexenone groups of said 10

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

12 peptide analog,

the R4's are the same or different and each R4 is either H or an amino acid side 13 14 chain,

R⁵ is a member selected from the group consisting of peptide chain

terminating groups and

$$R^7$$
 R^1
 R^2
 R^3

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19 20 in which R⁷ is a member selected from the group consisting of H, alkyl, acyl, carbamoyl, and alkoxycarbamoyl, and * denotes the site of attachment,

21 22

R⁶ is a member selected from the group consisting of peptide chain terminating groups and

in which R⁸ is a member selected from the group consisting of hydroxyl, alkoxy, alkylamino, dialkylamino, and arylamino, and * denotes the site of attachment, and

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n is at least 2.

- - 22. The peptide analog of claim 21 in which R^1 is CH_2 and R^2 is N.
- 1 23. The peptide analog of claim 21 in which R^1 is NH and R^2 is CH.
- 1 24. The peptide analog of claim 21 in which R¹ is NH and R² is N.
- 1 25. The peptide analog of claim 21 in which R^1 is CH_2 and R^2 is CH.
- 1 26. The peptide analog of claim 21 in which said peptide analog is an 2 L-stereoisomer relative to R³ when R³ is an amino acid side chain
- The peptide analog of claim 21 in which all R³'s are side chains of natural amino acids.
- 1 28. The peptide analog of claim 21 in which at least one R³ is a side chain 2 of a natural amino acid.
- The peptide analog of claim 21 in which each R⁴ is either H or a side chain of a natural amino acid.
- 1 30. The peptide analog of claim 21 in which at least one R⁴ is either H or a side chain of a natural amino acid.
- The peptide analog of claim 21 in which all R³'s and all R⁴'s are members selected from the group consisting of H, C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by
- 3 -O-, C₁-C₆ alkyl interrupted by -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-

4 $(C_1-C_6 \text{ alkyl})$, guanidino- $(C_1-C_6 \text{ alkyl})$, carbamoyl- $(C_1-C_6 \text{ alkyl})$, mercapto- $(C_1-C_6 \text{ alkyl})$, indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃ alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆ 5 alkyl), imidazolyl-(C₁-C₆ alkyl), phenyl, and sulfoximino-(C₁-C₆ alkyl). 6 The peptide analog of claim 21 in which all R³'s and all R⁴'s are 1 **32**. 2 members selected from the group consisting of H, C₁-C₄ alkyl, hydroxy -(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino -(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ 3 4 alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ 5 alkyl), and hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$. The peptide analog of claim 21 in which R¹ is CH₂, R² is N, and all 1 **33**. R³'s and all R⁴'s are members selected from the group consisting of H, C₁-C₄ alkyl, hydroxy -2 $(C_1-C_2 \text{ alkyl})$, carboxy- $(C_1-C_2 \text{ alkyl})$, amino- $(C_3-C_5 \text{ alkyl})$, guanidino - $(C_2-C_4 \text{ alkyl})$, 3 4 carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, 5 phenyl- $(C_1-C_2 \text{ alkyl})$, and hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$. The peptide analog of claim 21 in which the R⁴'s are a combination 1 34. 2 comprising side chains of natural and unnatural amino acids. The peptide analog of claim 21 in which each R⁴ is either H or a side 1 **35**. 2 chain of a natural amino acid. 1 **36**. The peptide analog of claim 21 in which all remaining amino acids in 2 said peptide analog are a combination comprising natural and unnatural amino acids. 1 **37**. The peptide analog of claim 21 in which all remaining amino acids in 2 said peptide analog are natural amino acids. 3 The peptide analog of claim 21 in which R⁵ is a member selected from **38**. 4 the group consisting of H, alkyl, acyl, carbamoyl, and alkoxycarbonyl. The peptide analog of claim 21 in which R⁵ is acetyl. 1 **39**.

The peptide analog of claim 21 in which R⁵ is

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40.

$$\mathbb{R}^7$$
 \mathbb{R}^1
 \mathbb{R}^2
 \mathbb{R}^3

- 2
- 1 41. The peptide analog of claim 21 in which R⁶ is a member selected from
- 2 the group consisting of hydroxyl, alkoxy, alkylamino, dialkylamino, and arylamino.
- 1 42. The peptide analog of claim 21 in which R⁶ is a member selected from 2 the group consisting of hydroxyl and methylamino.
 - 43. The peptide analog of claim 21 in which R^6 is

$$R^1$$
 R^2
 R^3

- 1 44. The peptide analog of claim 21 in which n is 2 to 100.
- 1 45. The peptide analog of claim 21 in which n is 2 to 50.
- 1 46. The peptide analog of claim 21 in which n is 2 to 5.
- 1 47. The peptide analog of claim 33 in which R^5 is a member selected from
- 2 the group consisting of H, alkyl, acyl, carbamoyl, and alkoxycarbonyl, and R⁶ is a member
- 3 selected from the group consisting of hydroxyl, alkoxy, alkylamino, dialkylamino, and
- 4 arylamino.
- 1 48. The peptide analog of claim 33 in which R⁵ is

$$R^7$$
 R^1
 R^2
 R^3

49. The peptide analog of claim 33 in which R^6 is

$$\begin{array}{c|c}
R^1 & R^2 \\
R^3 & R^8
\end{array}$$

 50. A peptide analog comprising a first segment consisting of a first sequence of amino acids joined by amide bonds and a second segment consisting of a second sequence of amino acids joined by amide bonds, in which at least one amino acid, but less than all amino acids, of said second segment is replaced by an azacyclohexenone group having the formula

in which:

 R^1 is CH_2 or NH,

9 R² is CH or N, and

10 R³ is H or an amino acid side chain,

such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and 12 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino 13 14 acid side chain, and when said peptide analog contains two or more azacyclohexenone groups of said 15 formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either 16 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said 17 18 peptide analog, 19 said first and second segments joined by a covalent linkage that permits said first and second 20 segments to enter into a β -sheet-like interaction with each other or with a third sequence of amino acids joined by amide bonds.

51. A peptide analog comprising a first segment consisting of a first sequence of amino acids joined by amide bonds and a second segment consisting of a second sequence of amino acids joined by amide bonds, in which at least one amino acid, but less than all amino acids, of said second segment is replaced by an azacyclohexenone group having the formula

$$\begin{cases}
O \\
R^1
\end{cases}$$

$$R^2$$

$$N$$

$$R^3$$

7 in which: R¹ is CH₂ or NH, 8 R² is CH or N, and 9 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and 10 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino 11 12 acid side chain, and when said peptide analog contains two or more azacyclohexenone groups of said 13 formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either 14 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

peptide analog,

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- 17 said first and second segments joined by a covalent linkage that permits said first and second 18 segments to enter into a β -sheet-like interaction with each other or with a third sequence of 19 amino acids joined by amide bonds.
- The peptide analog of claim 50 in which R¹ is CH₂ and R² is N. 1 **52**.
- The peptide analog of claim 50 in which R¹ is NH and R² is CH. 1 **53**.
- The peptide analog of claim 50 in which R^1 is NH and R^2 is N. 1 **54**.
- The peptide analog of claim 50 in which R¹ is CH₂ and R² is CH. 1 **55**.
- 1 The peptide analog of claim 50 in which said peptide analog is an **56**. L-stereoisomer relative to R³ when R³ is an amino acid side chain 2
- The peptide analog of claim 50 in which all R³'s are side chains of 1 **57**. 2 natural amino acids.
- The peptide analog of claim 50 in which at least one R³ is a side chain 1 **58**. 2 of a natural amino acid.
- 1 **59**. The peptide analog of claim 50 in which all R³'s are members selected 2
- from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl 3
- interrupted by -S-, hydroxy -(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino -(C₁-C₆ alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), indolyl-(C₁-C₃ 4
- 5 alkyl), phenyl- $(C_1-C_3 \text{ alkyl})$, hydroxyphenyl- $(C_1-C_6 \text{ alkyl})$, halophenyl- $(C_1-C_6 \text{ alkyl})$,
- 6
- imidazolyl-(C₁-C₆ alkyl), phenyl, and sulfoximino-(C₁-C₆ alkyl).
- 1 The peptide analog of claim 50 in which all R³'s are members selected **60**.
- 2 from the group consisting of C_1 - C_4 alkyl, hydroxy -(C_1 - C_2 alkyl), carboxy-(C_1 - C_2 alkyl),
- amino-(C₃-C₅ alkyl), guanidino -(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ 3
- alkyl), methylthio-(C1-C3 alkyl), indolylmethyl, phenyl-(C1-C2 alkyl), and hydroxyphenyl-4
- 5 $(C_1-C_2 \text{ alkyl}).$
- The peptide analog of claim 50 in which R¹ is CH₂, R² is N, and all 1 61.
- R^3 's are members selected from the group consisting of C_1 - C_4 alkyl, hydroxy -(C_1 - C_2 alkyl), 2
- carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino -(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ 3

4	alkyl), mercapto-	C_1 - C_2 alkyl), methylthio- $(C_1$ - C_3 alkyl), indolylmethyl, phenyl- $(C_1$ - C_2
5		yphenyl-(C ₁ -C ₂ alkyl).
1	62	The peptide analog of claim 50 in which the amino acids in said first
2	segment are a con	bination of natural and unnatural amino acids.
1	63	The peptide analog of claim 50 in which the amino acids in said first
2 segment are natural amino acids.		
1	64	The peptide analog of claim 50 in which the remaining amino acids in
2	said second segm	nt are a combination of natural and unnatural amino acids.
1	65	The peptide analog of claim 50 in which the remaining amino acids in
2	said second segm	nt are natural amino acids.
1	66	The peptide analog of claim 50 in which said second segment consists
2	of an amino acid	equence in which two or more non-adjacent amino acids are replaced by
3	azacyclohexenone	groups of said formula.
1	67	The peptide analog of claim 50 in which, in at least a portion of said
2	second segment,	very second amino acid is replaced by azacyclohexenone groups of said
3	formula.	
1	68	The peptide analog of claim 50 in which said first segment contains
2	from 3 to 200 ami	no acids and in said second segment the total number of amino acids and
3	azacyclohexenone	groups is from 3 to 200.
1	69	The peptide analog of claim 50 in which said first segment contains
2	from 3 to 20 amin	acids and in said second segment the total number of amino acids and
3	azacyclohexenone	groups is from 3 to 20.
1	70	The peptide analog of claim 50 in which said covalent linkage is a
2	member selected	rom the group consisting of D-Pro-Ala and Asn-Gly.
1	71.	A compound having the formula

$$R^{11} \xrightarrow{N} R^{2}$$

$$R^{2}$$

$$R^{12}$$

4

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3 in which: R¹ is CH₂ or NH, 4 R² is CH or N. 5 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain. 6 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino 7 8 acid side chain, R¹¹ is a nitrogen protecting group, and 9 R¹² is a member selected from the group consisting of OH, SH, and activated 10 11 leaving groups. The compound of claim 71 in which R^1 is CH_2 and R^2 is N. 1 **72**. The compound of claim 71 in which R¹ is NH and R² is CH. 1 **73**. 1 **74**. The compound of claim 71 in which R^1 is NH and R^2 is N. The compound of claim 71 in which R¹ is CH₂ and R² is CH. 1 **75**. 1 **76**. The compound of claim 71 in which said compound is an L-stereoisomer relative to R³ when R³ is an amino acid side chain 2 The compound of claim 71 in which R³ is a side chain of a natural 1 77. 2 amino acid. The compound of claim 71 in which R³ is a member selected from the 1 **78**. group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl interrupted by 2 3 -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino-(C₁-C₆

indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃ alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆

alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), (C₁-C₃ alkyl)thio-(C₁-C₃ alkyl),

alkyl), imidazolyl-(C₁-C₆ alkyl), phenyl, and sulfoximino-(C₁-C₆ alkyl).

- The compound of claim 71 in which R³ is a member selected from the
- 2 group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅
- alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl),
- 4 methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and hydroxyphenyl-(C₁-C₂
- 5 alkyl).
- 1 80. The compound of claim 71 in which R^1 is CH_2 , R^2 is N, and R^3 is a
- 2 member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-
- 3 (C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl),
- 4 mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and
- 5 hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.
- 1 81. The compound of claim 80 in which R¹² is OH.
- 1 82. The compound of claim 80 in which R¹² is an activated leaving group.
- 1 83. A compound having a formula selected from the group consisting of

- 4 R^1 is CH_2 or NH,
- 5 R^2 is CH or N,
- 6 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain,
- when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino acid side chain, and

when R¹, R², and R³ occur twice in said formula, each R¹ is either the same or 9 different, each R² is either the same or different, and each R³ is either 10 11 the same or different, R²¹ is H or an amino acid side chain: 12 R²² is H or an amino acid side chain: 13 R²³ is a member selected from the group consisting of H and amine protecting 14 15 groups; and R²⁴ is a member selected from the group consisting of an activated leaving 16 group, OR²⁵ where R²⁵ is H or an oxygen-protecting group, SR²⁶ where 17 R^{26} is H or an alkyl or aryl group, and $N(R^{27})_2$, where the R^{27} 's are 18 members independently selected from the group consisting of H, alkyl, 19 20 and aryl; 21 and amine-protected analogs of those of said group that terminate in H₂N-, carboxy-protected analogs of those of said group that terminate in -CO₂H, carboxy-activated analogs of those of 22 23

said group that terminate in -CO₂H, amine-protected and carboxy-protected analogs of

$$R^{21}$$
 R^{1}
 R^{2}
 R^{22}
 R^{23}

25 and amine-protected and carboxy-activated analogs of

24

$$\begin{array}{c|c} R^{21} & R^1 & R^2 & R^{22} \\ H_2N & N & N & N & CO_2H \end{array}$$

- The compound of claim 83 in which R1 is CH2 and R2 is N. 1 **84**.
- The compound of claim 83 in which R¹ is NH and R² is CH. 1 **85**.
- The compound of claim 83 in which R¹ is NH and R² is N. 1 86.
- The compound of claim 83 in which R¹ is CH₂ and R² is CH. 1 **87**.

1	88. The compound of claim 83 in which said compound is an		
2	L-stereoisomer relative to R ³ when R ³ is an amino acid side chain.		
1	89. The compound of claim 83 in which R^3 is a side chain of a natural		
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2	amino acid of a natural amino acid.		
1	90. The compound of claim 83 in which R ³ is a side chain of an unnatural		
2	amino acid of a natural amino acid.		
1	91. The compound of claim 83 in which R ³ is a side chain of a natural		
2	amino acid and R ²¹ and R ²² are independently H or side chains of natural amino acids.		
1	92. The compound of claim 83 in which at least one of \mathbb{R}^3 , \mathbb{R}^{21} , and \mathbb{R}^{22} is		
2	side chain of a natural amino acid.		
1	93. The compound of claim 83 in which R^3 , R^{21} , and R^{22} are members		
2	selected from the group consisting of H, C ₁ -C ₆ alkyl, C ₁ -C ₆ alkyl interrupted by -O-, C ₁ -C ₆		
3	alkyl interrupted by -S-, hydroxy-(C ₁ -C ₆ alkyl), carboxy-(C ₁ -C ₆ alkyl), amino-(C ₁ -C ₆ alkyl),		
4	guanidino-(C ₁ -C ₆ alkyl), carbamoyl-(C ₁ -C ₆ alkyl), mercapto-(C ₁ -C ₆ alkyl), indolyl-(C ₁ -C ₃		
5	alkyl), phenyl-(C1-C3 alkyl), hydroxyphenyl-(C1-C6 alkyl), halophenyl-(C1-C6 alkyl),		
6	imidazolyl-(C ₁ -C ₆ alkyl), phenyl, and sulfoximino-(C ₁ -C ₆ alkyl).		
1	94. The compound of claim 83 in which R^3 , R^{21} , and R^{22} are members		
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2	selected from the group consisting of H, C ₁ -C ₄ alkyl, hydroxy-(C ₁ -C ₂ alkyl), carboxy-(C ₁ -C ₂		
3	alkyl), amino-(C ₃ -C ₅ alkyl), guanidino-(C ₂ -C ₄ alkyl), carbamoyl-(C ₁ -C ₂ alkyl), mercapto-		
4	$(C_1-C_2 \text{ alkyl})$, methylthio- $(C_1-C_3 \text{ alkyl})$, indolylmethyl, phenyl- $(C_1-C_2 \text{ alkyl})$, and		
5	hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.		
1	95. The compound of claim 83 in which R ¹ is CH ₂ , R ² is N, and R ³ , R ²¹ ,		
2	and R ²² are members selected from the group consisting of H, C ₁ -C ₄ alkyl, hydroxy-(C ₁ -C ₂		
3	alkyl), carboxy-(C ₁ -C ₂ alkyl), amino-(C ₃ -C ₅ alkyl), guanidino-(C ₂ -C ₄ alkyl), carbamoyl-		
4	$(C_1-C_2 \text{ alkyl})$, mercapto- $(C_1-C_2 \text{ alkyl})$, methylthio- $(C_1-C_3 \text{ alkyl})$, indolylmethyl, phenyl-		
5	(C_1 - C_2 alkyl), and hydroxyphenyl-(C_1 - C_2 alkyl).		
1	96. The compound of claim 83 which is a member selected from the group		
2	consisting of compounds of the formula		

$$\begin{array}{c|c}
R^{21} & R^1 \\
R^2 & R^2 \\
N & R^{24}
\end{array}$$

4 in which R²⁴ is a member selected from the group consisting of an activated leaving group,

- 5 OR²⁵ where R²⁵ is H or an oxygen-protecting group, SR²⁶ where R²⁶ is H or an alkyl or aryl
- 6 group, or NR²⁷₂ where the R²⁷'s are members independently selected from the group
- 7 consisting of H, alkyl, or aryl; and amine-protected analogs of said compounds.
 - 97. The compound of claim 83 which is a member selected from the group consisting of compounds of the formula

$$\begin{array}{c|c}
 & O \\
 & R^{1} \\
 & R^{2} \\
 & R^{22} \\
 & N \\
 & R^{22} \\
 & N \\
 & CO_{2}H
\end{array}$$

- 4 in which R²³ is an amine protecting group, and carboxy-protected analogs of said compounds.
- 1 98. The compound of claim 83 which is a member selected from the group consisting of compounds of the formula

$$\begin{array}{c|cccc}
& O & O & O & O \\
R^1 & R^2 & R^{21} & R^1 & R^2 \\
R^{23} & N & N & N & N & R^{24}
\end{array}$$

- 4 in which R^{23} is an amine protecting group and R^{24} is a member selected from the group
- 5 consisting of an activated leaving group, OR^{25} where R^{25} is H or an oxygen-protecting group,
- 6 SR²⁶ where R²⁶ is H or an alkyl or aryl group, or NR(²⁷)₂ where each R²⁷ is a member
- 7 independently selected from the group consisting of H, alkyl, or aryl; and amine-protected
- 8 analogs of said compounds.

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- 1 99. The compound of claim 83 which is a member selected from the group
- 2 consisting of compounds of the formula

$$R^{21}$$
 R^{1}
 R^{2}
 R^{22}
 R^{22}
 R^{22}
 R^{22}
 R^{22}
 R^{22}
 R^{22}
 R^{23}
 R^{23}
 R^{23}

amine-protected analogs of said compounds, carboxy-protected analogs of said compounds,
 amine-protected and carboxy-protected analogs of said compounds, and amine-protected and
 carboxy-activated analogs of said compounds.

100. A method for inhibiting the association of a selected peptide with other peptides, said method comprising contacting said selected peptide with a peptide analog defined as a peptide in which at least one amino acid, but less than all amino acids is replaced by an azacyclohexenone group having the formula

6 in which:

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7 R^1 is CH_2 or NH,

 R^2 is CH or N, and

9 R³ is H or an amino acid side chain,

such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

acid side chain,

14 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R^1 , R^2 , and R^3 of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

17 peptide analog,

to achieve a β -sheet like interaction between said selected peptide and said peptide analog.

- 101. A method for inhibiting the association of a selected peptide with other peptides, said method comprising contacting said selected peptide with a peptide analog defined as a peptide in which at least one amino acid, but less than all amino acids is replaced
- 4 by an azacyclohexenone group having the formula

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7 R^1 is CH_2 or NH,

8 R² is CH or N, and

9 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

11 acid side chain,

12 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

15 peptide analog,

16 to achieve a β -sheet like interaction between said selected peptide and said peptide analog.

1 102. The method of claim 101 in which R^1 is CH_2 and R^2 is N.

1 103. The method of claim 101 in which R¹ is NH and R² is CH.

1 104. The method of claim 101 in which R¹ is NH and R² is N.

105. The method of claim 101 in which R^1 is CH_2 and R^2 is CH.

1 106. The method of claim 101 in which said azacyclohexenone group is an

2 L-stereoisomer relative to R³ when R³ is an amino acid side chain.

The method of claim 101 in which R³ is a member selected from the 1 **107**. 2 group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl interrupted by 3 -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino-(C₁-C₆ 4 alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃ 5 alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆ alkyl), imidazolyl-(C₁-C₆ alkyl), 6 phenyl, and sulfoximino-(C₁-C₆ alkyl). 1 **108**. The method of claim 101 in which R³ is a member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ 2 3 alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and hydroxyphenyl-(C₁-C₂ 4 5 alkyl). The method of claim 101 in which R¹ is CH₂, R² is N, and R³ is a 1 109. 2 member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-3 (C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and 4 5 hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$. 1 The method of claim 101 in which said peptide analog is a peptide in 110. 2 which two or more non-adjacent amino acids are replaced by azacyclohexenone groups of said formula. 3 1 The method of claim 101 in which said peptide analog is a peptide in 111. which, in at least a portion thereof, every second amino acid is replaced by an 2 3 azacyclohexenone group of said formula, and the number of said azacyclohexenone groups in 4 said peptide analog is two or more. 1 112. The method of claim 101 in which the total number of amino acids and 2 azacyclohexenone groups in said peptide analog is from 3 to 200. 1 113. The method of claim 101 in which the total number of amino acids and 2 azacyclohexenone groups in said peptide analog is from 4 to 20. 1 114. A method for inhibiting the association of a peptide with a double

stranded nucleic acid, said method comprising contacting said peptide with a peptide analog

- defined as a peptide in which at least one amino acid, but less than all amino acids, is
- 4 replaced by an azacyclohexenone group having the formula

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7 R^1 is CH_2 or NH,

R² is CH or N, and

9 R³ is H or an amino acid side chain,

such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

13 acid side chain,

14 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

17 peptide analog,

18 to achieve a β -sheet-like interaction between said peptide and said peptide analog.

- 1 115. A method for inhibiting the association of a peptide with a double
- 2 stranded nucleic acid, said method comprising contacting said peptide with a peptide analog
- defined as a peptide in which at least one amino acid, but less than all amino acids, is
- 4 replaced by an azacyclohexenone group having the formula

6 in which:

7 R^1 is CH_2 or NH,

8 R² is CH or N, and

9 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

11 acid side chain,

12 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

15 peptide analog,

16 to achieve a β -sheet-like interaction between said peptide and said peptide analog.

- 1 116. The method of claim 115 in which R^1 is CH_2 and R^2 is N.
- 1 The method of claim 115 in which R¹ is NH and R² is CH.
- 1 118. The method of claim 115 in which R^1 is NH and R^2 is N.
- 1 119. The method of claim 115 in which R^1 is CH_2 and R^2 is CH.
- 1 120. The method of claim 115 in which said azacyclohexenone group is an 2 L-stereoisomer relative to R³ when R³ is an amino acid side chain.
- 1 121. The method of claim 115 in which R³ is a member selected from the
- 2 group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl interrupted by
- 3 -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino-(C₁-C₆
- 4 alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃
- 5 alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆ alkyl), imidazolyl-(C₁-C₆ alkyl),
- 6 phenyl, and sulfoximino-(C₁-C₆ alkyl).

1	122. The method of claim 115 in which R ³ is a member selected from the			
2	group consisting of C ₁ -C ₄ alkyl, hydroxy -(C ₁ -C ₂ alkyl), carboxy-(C ₁ -C ₂ alkyl), amino-(C ₃ -C ₄			
3	alkyl), guanidino -(C2-C4 alkyl), carbamoyl-(C1-C2 alkyl), mercapto-(C1-C2 alkyl),			
4	methylthio-(C ₁ -C ₃ alkyl), indolylmethyl, phenyl-(C ₁ -C ₂ alkyl), and hydroxyphenyl-(C ₁ -C ₂			
5	alkyl).			
1	123. The method of claim 115 in which R ¹ is CH ₂ , R ² is N, and R ³ is a			
2	member selected from the group consisting of C ₁ -C ₄ alkyl, hydroxy -(C ₁ -C ₂ alkyl), carboxy-			
3	(C1-C2 alkyl), amino-(C3-C5 alkyl), guanidino -(C2-C4 alkyl), carbamoyl-(C1-C2 alkyl),			
4	mercapto-(C ₁ -C ₂ alkyl), methylthio-(C ₁ -C ₃ alkyl), indolylmethyl, phenyl-(C ₁ -C ₂ alkyl), and			
5	hydroxyphenyl-(C ₁ -C ₂ alkyl).			
1	124. The method of claim 115 in which said peptide analog is a peptide in			
2	which two or more non-adjacent amino acids are replaced by azacyclohexenone groups of			
3	said formula.			
1	125. The method of claim 115 in which said peptide analog is a peptide in			
2	which, in at least a portion thereof, every second amino acid is replaced by an			
3	azacyclohexenone group of said formula, and the number of said azacyclohexenone groups i			
4	said peptide analog is two or more.			
1	126. The method of claim 115 in which the total number of amino acids and			
2	azacyclohexenone groups in said peptide analog is from 3 to 200.			
1	127. The method of claim 115 in which the total number of amino acids and			
2	azacyclohexenone groups in said peptide analog is from 4 to 20.			
1	128. A method for inhibiting the biological activity of a peptide, said			
2	method comprising contacting said peptide with a peptide analog defined as a peptide in			
3	which at least one amino acid, but less than all amino acids, is replaced by an			
4	azacyclohexenone group having the formula			

$$\begin{cases}
0 \\
R^{2} \\
N
\end{cases}$$

$$R^{3}$$

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7 R^1 is CH_2 or NH,

8 R² is CH or N, and

9 R³ is H or an amino acid side chain,

such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

13 acid side chain.

14 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

17 peptide analog,

18 to achieve a β -sheet-like interaction between said peptide and said peptide analog.

129. A method for inhibiting the biological activity of a peptide, said

method comprising contacting said peptide with a peptide analog defined as a peptide in

which at least one amino acid, but less than all amino acids, is replaced by an

4 azacyclohexenone group having the formula

$$\begin{bmatrix}
R^1 & R^2 \\
N & R^3
\end{bmatrix}$$

56 in which:

7	R ¹ is CH ₂ or NH,			
8	R ² is CH or N, and			
9	when R ¹ is CH ₂ and R ² is CH, R ³ is an amino acid side chain, and			
10	when either R ¹ is NH, or R ² is N, or R ¹ is NH and R ² is N, R ³ is H or an amino			
11	acid side chain,			
12	and when said peptide analog contains two or more azacyclohexenone groups of said			
13	formula, R1, R2, and R3 of any one azacyclohexenone group in said peptide analog are either			
14	the same as or different from R ¹ , R ² , and R ³ of any other azacyclohexenone group in said			
15	peptide analog,			
16	to achieve a β -sheet-like interaction between said peptide and said peptide analog.			
1	130. The method of claim 129 in which R^1 is CH_2 and R^2 is N .			
1	131. The method of claim 129 in which R ¹ is NH and R ² is CH.			
1	132. The method of claim 129 in which R^1 is NH and R^2 is N.			
1	133. The method of claim 129 in which R^1 is CH_2 and R^2 is CH .			
1	134. The method of claim 129 in which said azacyclohexenone group is an			
2	L-stereoisomer relative to R ³ when R ³ is an amino acid side chain.			
1	135. The method of claim 129 in which R ³ is a member selected from the			
2	group consisting of C ₁ -C ₆ alkyl, C ₁ -C ₆ alkyl interrupted by -O-, C ₁ -C ₆ alkyl interrupted by			
3	-S-, hydroxy -(C_1 - C_6 alkyl), carboxy-(C_1 - C_6 alkyl), amino-(C_1 - C_6 alkyl), guanidino -(C_1 - C_6			
4	alkyl), carbamoyl-(C ₁ -C ₆ alkyl), mercapto-(C ₁ -C ₆ alkyl), indolyl-(C ₁ -C ₃ alkyl), phenyl-(C ₁ -C ₃			
5	alkyl), hydroxyphenyl-(C_1 - C_6 alkyl), halophenyl-(C_1 - C_6 alkyl), imidazolyl-(C_1 - C_6 alkyl),			
6	phenyl, and sulfoximino-(C ₁ -C ₆ alkyl).			
1	136. The method of claim 129 in which R ³ is a member selected from the			
2	group consisting of C ₁ -C ₄ alkyl, hydroxy -(C ₁ -C ₂ alkyl), carboxy-(C ₁ -C ₂ alkyl), amino-(C ₃ -C ₅			
3	alkyl), guanidino -(C2-C4 alkyl), carbamoyl-(C1-C2 alkyl), mercapto-(C1-C2 alkyl),			
4	methylthio- $(C_1-C_3 \text{ alkyl})$, indolylmethyl, phenyl- $(C_1-C_2 \text{ alkyl})$, and hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$			
5	alkyl).			
1	137. The method of claim 129 in which R ¹ is CH ₂ , R ² is N, and R ³ is a			
2	member selected from the group consisting of C ₁ -C ₄ alkyl, hydroxy -(C ₁ -C ₂ alkyl), carboxy-			

- 3 (C₁-C₂ alkyl), amino-(C₃-C₅ alkyl), guanidino -(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl),
- 4 mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and
- 5 hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.
- 1 138. The method of claim 129 in which said peptide analog is a peptide in
- 2 which two ormore non-adjacent amino acids are replaced by azacyclohexenone groups of
- 3 said formula.
- 1 139. The method of claim 129 in which said peptide analog is a peptide in
- 2 which, in at least a portion thereof, every second amino acid is replaced by an
- 3 azacyclohexenone group of said formula, and the number of said azacyclohexenone groups in
- 4 said peptide analog is two or more.
- 1 140. The method of claim 129 in which the total number of amino acids and
- 2 azacyclohexenone groups in said peptide analog is from 3 to 200.
- 1 141. The method of claim 129 in which the total number of amino acids and
- 2 azacyclohexenone groups in said peptide analog is from 4 to 20.
- 1 142. A method for increasing the tendency of a target peptide or a portion of
- 2 a target peptide to assume a β -strand conformation, said method comprising contacting said
- 3 target peptide with a peptide analog defined as a peptide in which at least one amino acid, but
- 4 less than all amino acids, is replaced by an azacyclohexenone group having the formula

$$\begin{cases}
0 \\
R^1
\end{cases}$$

$$R^2$$

$$R^3$$

- 7 R^1 is CH_2 or NH,
- 8 R² is CH or N, and
- 9 R³ is H or an amino acid side chain,
- such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and 11 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino 12 13 acid side chain, 14 and when said peptide analog contains two or more azacyclohexenone groups of said formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either 15 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said 16 17 peptide analog, 18 to achieve a β -sheet-like interaction between said peptide and said peptide analog.

143. A method for increasing the tendency of a target peptide or a portion of a target peptide to assume a β -strand conformation, said method comprising contacting said target peptide with a peptide analog defined as a peptide in which at least one amino acid, but less than all amino acids, is replaced by an azacyclohexenone group having the formula

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$$\begin{cases}
0 \\
R^1
\end{cases}$$

$$R^2$$

$$R^3$$

6 in which: R¹ is CH₂ or NH, 7 R² is CH or N, and 8 when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and 9 when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino 10 11 acid side chain, 12 and when said peptide analog contains two or more azacyclohexenone groups of said formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either 13 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said 14 15 peptide analog, 16 to achieve a β -sheet-like interaction between said peptide and said peptide analog.

144. The method of claim 143 in which R¹ is CH₂ and R² is N.

145. The method of claim 143 in which R¹ is NH and R² is CH.

The method of claim 143 in which R¹ is NH and R² is N. 1 **146**. The method of claim 143 in which R¹ is CH₂ and R² is CH. 1 147. 1 148. The method of claim 143 in which said azacyclohexenone group is an L-stereoisomer relative to R³ when R³ is an amino acid side chain. 2 1 The method of claim 143 in which R³ is a member selected from the 149. group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl interrupted by 2 3 -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino-(C₁-C₆ 4 alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃ 5 alkyl), hydroxyphenyl- (C_1-C_6) alkyl), halophenyl- (C_1-C_6) alkyl), imidazolyl- (C_1-C_6) alkyl), 6 phenyl, and sulfoximino- $(C_1-C_6 \text{ alkyl})$. The method of claim 143 in which R³ is a member selected from the 1 **150**. 2 group consisting of C₁-C₄ alkyl, hydroxy -(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅ 3 alkyl), guanidino -(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl), 4 methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and hydroxyphenyl-(C₁-C₂ 5 alkyl). The method of claim 143 in which R¹ is CH₂, R² is N, and R³ is a 1 **151**. 2 member selected from the group consisting of C₁-C₄ alkyl, hydroxy -(C₁-C₂ alkyl), carboxy- $(C_1-C_2 \text{ alkyl})$, amino- $(C_3-C_5 \text{ alkyl})$, guanidino - $(C_2-C_4 \text{ alkyl})$, carbamoyl- $(C_1-C_2 \text{ alkyl})$, 3 4 mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and 5 hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$. 1 The method of claim 143 in which said peptide analog is a peptide in 2 which two ormore non-adjacent amino acids are replaced by azacyclohexenone groups of 3 said formula. 1 **153**. The method of claim 143 in which said peptide analog is a peptide in 2 which, in at least a portion thereof, every second amino acid is replaced by an 3 azacyclohexenone group of said formula, and the number of said azacyclohexenone groups in 4 said peptide analog is two or more.

- 154. The method of claim 143 in which the total number of amino acids and azacyclohexenone groups in said peptide analog is from 3 to 200.
- 1 155. The method of claim 143 in which the total number of amino acids and 2 azacyclohexenone groups in said peptide analog is from 4 to 20.
 - 156. A method for extracting a target peptide having a selected amino acid sequence from a mixture of peptides, said method comprising contacting said mixture with a capture peptide that is covalently bonded to a solid support and associates with said amino acid sequence in a β -sheet interaction, said capture peptide comprising amino acids and at least one azacyclohexenone group having the formula

$$\begin{cases}
0 \\
R^1
\end{cases}$$

$$R^2$$

$$R^3$$

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8 R¹ is CH₂ or NH,

9 R² is CH or N, and

10 R³ is H or an amino acid side chain,

such that in at least one such azacyclohexenone group:

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

14 acid side chain,

and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

18 peptide analog,

19 to achieve a β -sheet-like interaction between said target peptide and said capture analog.

157. A method for extracting a target peptide having a selected amino acid sequence from a mixture of peptides, said method comprising contacting said mixture with a

- 3 capture peptide that is covalently bonded to a solid support and associates with said amino
- 4 acid sequence in a β -sheet interaction, said capture peptide comprising amino acids and at
- 5 least one azacyclohexenone group having the formula

6

8 R¹ is CH₂ or NH,

9 R² is CH or N, and

when R¹ is CH₂ and R² is CH, R³ is an amino acid side chain, and

when either R¹ is NH, or R² is N, or R¹ is NH and R² is N, R³ is H or an amino

12 acid side chain,

13 and when said peptide analog contains two or more azacyclohexenone groups of said

formula, R¹, R², and R³ of any one azacyclohexenone group in said peptide analog are either

15 the same as or different from R¹, R², and R³ of any other azacyclohexenone group in said

16 peptide analog,

17 to achieve a β -sheet-like interaction between said target peptide and said capture analog.

- 1 158. The method of claim 157 in which R^1 is CH_2 and R^2 is N.
- 1 159. The method of claim 157 in which R¹ is NH and R² is CH.
- 1 160. The method of claim 157 in which R¹ is NH and R² is N.
- 1 161. The method of claim 157 in which R^1 is CH_2 and R^2 is CH.
- 1 162. The method of claim 157 in which said azacyclohexenone group is an 2 L-stereoisomer relative to R³ when R³ is an amino acid side chain.
- 1 163. The method of claim 157 in which R³ is a member selected from the 2 group consisting of C₁-C₆ alkyl, C₁-C₆ alkyl interrupted by -O-, C₁-C₆ alkyl interrupted by
- 3 -S-, hydroxy-(C₁-C₆ alkyl), carboxy-(C₁-C₆ alkyl), amino-(C₁-C₆ alkyl), guanidino-(C₁-C₆

- 4 alkyl), carbamoyl-(C₁-C₆ alkyl), mercapto-(C₁-C₆ alkyl), indolyl-(C₁-C₃ alkyl), phenyl-(C₁-C₃
- 5 alkyl), hydroxyphenyl-(C₁-C₆ alkyl), halophenyl-(C₁-C₆ alkyl), imidazolyl-(C₁-C₆ alkyl),
- 6 phenyl, and sulfoximino- $(C_1-C_6 \text{ alkyl})$.
- 1 164. The method of claim 157 in which R³ is a member selected from the
- 2 group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-(C₁-C₂ alkyl), amino-(C₃-C₅
- 3 alkyl), guanidino-(C₂-C₄ alkyl), carbamoyl-(C₁-C₂ alkyl), mercapto-(C₁-C₂ alkyl),
- 4 methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and hydroxyphenyl-(C₁-C₂
- 5 alkyl).
- 1 165. The method of claim 157 in which R¹ is CH₂, R² is N, and R³ is a
- 2 member selected from the group consisting of C₁-C₄ alkyl, hydroxy-(C₁-C₂ alkyl), carboxy-
- 3 (C_1 - C_2 alkyl), amino-(C_3 - C_5 alkyl), guanidino-(C_2 - C_4 alkyl), carbamoyl-(C_1 - C_2 alkyl),
- 4 mercapto-(C₁-C₂ alkyl), methylthio-(C₁-C₃ alkyl), indolylmethyl, phenyl-(C₁-C₂ alkyl), and
- 5 hydroxyphenyl- $(C_1-C_2 \text{ alkyl})$.
- 1 166. The method of claim 157 in which said capture peptide is a peptide in
- 2 which two or more non-adjacent amino acids are replaced by azacyclohexenone groups of
- 3 said formula.
- 1 167. The method of claim 157 in which said capture peptide is a peptide in
- which, in at least a portion thereof, every second amino acid is replaced by an
- 3 azacyclohexenone group of said formula, and the number of said azacyclohexenone groups in
- 4 said peptide analog is two or more.
- 1 168. The method of claim 157 in which the total number of amino acids and
- 2 azacyclohexenone groups in said capture peptide is from 3 to 200.
- 1 169. The method of claim 157 in which the total number of amino acids and
- 2 azacyclohexenone groups in said capture peptide is from 4 to 20.